CPB-8

AUDIO VISUAL SYSTEM

Project Scope

The University of Texas MD Anderson Cancer Center is seeking responses to this RFP from qualified vendors to Provide and Install a complete and working Audiovisual and Control System in our new Cancer Prevention Building as described in the RFP documents. The project includes the purchase of new audiovisual and control equipment, installation, programming, documentation, training and extended warranty. All vendors should watch the procurement web site daily for project amendments.

PART 1 - GENERAL

1.1 DEFINITIONS

A. Section Includes - Complete and working audio visual system for the Level 8 Conference Area and the Level 8 Classroom/Television Studio in the Cancer Prevention Building at the University of Texas M D Anderson Cancer Center in Houston, Texas.

1.2 PERFORMANCE REQUIREMENTS

A. High-quality display of video and RGBHV sources.

B. Simple, intuitive control of major system components.

C. Install system in professional manner using balanced audio lines and separation of conductors carrying different voltage levels to reduce system hum and crosstalk

D. Proper layout of equipment and cables in Equipment Racks, providing flexible operation, ease of service, and neat appearance.

E. All new equipment to meet or exceed manufacturer's specifications.

F. System to be adjusted for best operation of all components.

G. Related Work Not Included
1. Electrical Work (conduit and electrical power wiring)
2. Millwork

1.3 SUBMITTALS

A. Work Progress Schedule
1. Number of Sets: 4.
2. Guidelines - Estimated progress schedule for Work, in relation to entire Project. Indicate dates for starting and completing various classifications of construction. Include specific dates for each submittal requirement, expected completion of conduit by Electrical Contractor (coordinate), expected completion of electrical power by Electrical Contractor (coordinate), Initial Tests and Adjustments, Final Tests and Adjustments, and Owner Training. Coordinate one 12-hour day of quiet time (during first shift) for Final Tests and Adjustments. Schedule items shall be subdivided such that no single item spans more than 30 calendar days.
3. Timetable — Submit for review within 2 weeks after receipt of contract. Update schedule as Work progresses.

B. Product Data
1. Number of Sets: 6.
2. Guidelines — According to General Conditions, minimum as follows.
   Major Equipment Data — Supply individual data sheet for each major manufactured equipment item. Include photographs of appearance, descriptions of finishes, dimensions, and technical data for review by Owner, Architect, and Consultant.
   Minor Equipment Data — Multiple-product data sheets for minor items (connectors, hardware, etc.) are acceptable. Clearly designate items submitted with red arrows or red underlines. Cross-out items not submitted.
   Bind product data sheets together either in GBC or 3-ring type binders.

3. Timetable
   Submit total quantity of complete sets of Product Data as required by General Conditions, no later than 30 days after award of contract. Partial submittals are not acceptable.
   Allow minimum of 30 days for review. Two sets will be returned with review comments. If resubmittal is required, resubmit total quantity of complete sets. If second resubmittal is required, Contractor shall reimburse Owner for expenses incurred during additional review process. Obtain approved Product Data before commencement of work.

C. Shop Drawings

1. Number of Sets: 6.
2. Minimum Scale
   a. Floor Plans: 1/8 inch = 1 foot
   b. Rack Elevations: 1 ½ inch = 1 foot
   c. Plate/Panel Details: 6 inches = 1 foot
   d. Loudspeaker Details 1 inch = 1 foot
3. Include as a minimum:
   a. Floor plans indicating locations of devices, vertical risers, pull boxes, and exposed wiring.
   b. Loudspeaker orientation details.
   c. Mounting detail drawings of loudspeakers, racks, and overhead equipment. Hire services of professional structural engineer, licensed to practice in the State of Texas, to review shop drawings, building structural drawings, and any existing structures from which equipment is to be suspended. Include Structural Engineer's stamped report with shop drawing submittal. Report to include: (a) itemization of items reviewed by the Structural Engineer, (b) confirmation that proposed methods of suspending equipment as shown on the shop drawings conform to required safety factors, and (c) confirmation that building structure from which equipment is to be suspended will support equipment including required safety factors.
   d. Rack elevations
   e. Complete schematic diagram. One-line diagram with detailed descriptions of product inputs and outputs is acceptable. Include terminal strip details and cable label information. If wiring diagram spans more than 3 sheets, additionally provide simplified block diagram of entire system on 1 sheet.
   f. Electrical power wiring diagram. Include circuit, switching, and control details.
   g. Wiring diagram of grounding and shielding scheme.
   h. Drawings for custom-fabricated items (i.e., plates, panels, cables, and assemblies).
   i. General construction drawings necessary for completion of work.
4. Guidelines
   a. Shop Drawings to be used for coordination between trades and updated as final record drawings.
   b. Number and title each drawing in logical manner as a set.
   c. Include on each drawings: Project, Building, location, Contractor Name, Architect, Acoustical Consultant, date, and revision number.
   d. Ensure that labeling on Shop Drawings match labeling on equipment.
   e. Bind Shop Drawings together to form set. Loose drawings will not be accepted.
   f. Copies of electronic CAD files including Contract Drawings will be made available from Consultant in AutoCAD LT 2000 or LT 2002 format.
5. Timetable
   a. Submit total quantity of complete sets of Shop Drawings as required by General Conditions, no later than 20 days after award of contract. Partial submittals are not acceptable.
   b. Allow minimum of 30 days for review. Two sets will be returned with review comments. If resubmittal is required, resubmit total quantity of complete sets. If second resubmittal is required, Contractor shall reimburse Owner for expenses incurred during additional review process.
   c. Obtain approved Shop Drawings before commencement of work.

D. Samples

1. Request for Samples - Upon request, furnish samples (at no additional cost) of submitted items proposed as substitutes for specified items. Products will be reviewed to determine if proposed substitute items meet required function and quality.
2. Product Tests - Products submitted as samples may require testing by independent laboratory. Testing at expense of Contractor.
3. Number of Samples — 1 for each item requested.
4. Timetable - Provide samples within 2 weeks of request. Allow minimum 2 weeks for review and product tests.
5. Approval - Obtain written approval of tested products before incorporating into system.

E. Proposed Test Equipment — Submit, for approval, a letter listing test equipment make, model numbers and calibration dates 10 days prior to scheduled Final Tests and Adjustments.

F. Initial Test Data — Submit results of Initial Tests and Adjustments for approval prior to scheduling Final Tests and Adjustments with Consultant and Owner.

G. Project Record Documents — Submit record documents in quantities, format, and timetable as required by General Conditions.

H. Operation and Maintenance Manuals
1. Number of Sets: 3.
2. Bind Operation and Maintenance Manuals using either GBC or 3-ring type binders.
3. Provide 3 sets of DC-R that include all material in Operation and Maintenance Manuals in PDF format except for copyrighted manuals.
4. Format and Minimum Information:
   a. Section 1 - System Operation
      i. Introduction/overview to system components and their functions and locations; brief listing of basic system functions
      ii. Complete but simple system operating instructions to accomplish basic system functions, written for non-technical personnel
      iii. Certificate indicating names of Owner personnel trained by Contractor, date of training, name of Contractor representative that provided training, and name of project.
   b. Section 2 - System Documentation
      i. Simplified system one-line schematic diagram showing changes made during construction
      ii. Complete inventory of system components including serial numbers. Identify location (equipment rack, over stage, stored in control room, etc.) of each component.
      iii. Cable and terminal strip documentation including cable numbers, functions, originating
      locations, terminating locations, and signal levels
      iv. All Shop Drawings corrected to reflect as-built conditions
      v. Other data and drawings required during construction
      vi. Initial Tests and Adjustments data
      vii. Final Tests and Adjustments data
      viii. Floppy diskettes or CD-ROM discs including all utilized manufacturer's software and saved copies of software configurations (configurations as established during Final Tests and Adjustments)
   c. Section 3 - Manufacturer's Documentation — Provide following documentation
      i. For each equipment model at no additional costs to Owner, even if manufacturer does not include costs of such documentation with purchase of equipment item.
      ii. Manufacturer's Product Data
      iii. Operating instructions
      iv. Installation instructions
      v. Service information
      vi. Schematic diagrams
      vii. Replacement parts lists
   d. Section 4 - Maintenance Information
      i. Preventive maintenance schedule letter clearly stating target dates of six month and end-of-warranty preventative maintenance inspections
      ii. Maintenance instructions including recommended maintenance schedule and information concerning proper inspection, testing, and replacement of components
      iii. Troubleshooting information complete with instructions for procedures during equipment failure
   e. Section 5 - Warranty Information
      i. System warranty letter
      ii. Manufacturer's warranties

5. Timetable
    a. Submit 1 set of Operation and Maintenance Manuals at least 10 days before Final Tests and Adjustments procedures (minus data from Final Tests and Adjustments). This set will be reviewed by Acoustical Consultant and returned to Contractor. Re-submit after Final Tests and Adjustments and include data. NOTE: Do not schedule Final Tests and Adjustments or perform training of Owner personnel before submitting Operation and Maintenance Manual.
    b. Leave 1 set of Operation and Maintenance Manuals with Owner's representative immediately following Final Tests and Adjustments procedures (minus data from Final Tests and Adjustments). Owner will utilize this set during initial use of the system. Following Final Tests and Adjustments, update this set of manuals at the project site as necessary so that it will match other completed sets of manuals.
    c. Submit remaining number of complete manuals as required by General Conditions within 10 days after return of reviewed set(s). Include Final Tests and Adjustment data, warranty period letter, and any other data not included in first submission.

I. Warranty - Submit letter providing warranty covering labor and materials supplied under this contract. Bind in Operation and Maintenance Manuals. Terms as described in General Conditions. Minimum terms as follows.
    1. System Warranty Period - Systems to be free of manufacturing or installation defects for a period of one year from the date of final acceptance. Clearly designate begin and end dates of system warranty period.
    2. Parts and Labor - Provide parts and labor to repair defects in materials and workmanship during system warranty period.
    3. Response Time - Within system warranty period, provide initial on-site service response within one business day of service call.
    4. Replacement Products - If any item must be removed for repair during system warranty period, provide replacement item of similar quality at no charge.
    5. Repair Limit - Do not repair any piece of equipment found defective during installation or system warranty period more than 2 times. After second repair, replace defective item with similar approved item at no additional cost to Owner.
    6. Extended Manufacturer's Warranties — Identify products with manufacturer's warranties extending beyond one year. Provide terms and conditions of such warranties.
    7. Service Personnel Information - Provide name(s) and telephone number(s) of service personnel to be contacted regarding repair and maintenance.

J. Owner Training — Provide owner training as described in General Conditions. As a minimum, provide 8 hours total instruction (within two trips to site) regarding Audio Visual Systems operation to Owner-designated personnel. Schedule instruction time(s) with Owner to occur after completion of Final Tests and Adjustments. Coordinate with Owner in advance to schedule instruction time. Document date, time, and attendees of the training session and include documentation in Operation and Maintenance Manuals to serve as record of trained personnel.

1.4 QUALITY ASSURANCE

Contractor Qualifications
1. Be established Audio Visual System Contractor, regularly engaged in furnishing and installing audiovisual systems. Contractor to have minimum of 5 years experience with audio visual system installations.
   NOTE: Electrical or general contracting firms responsible for completion of this work, but not meeting above requirement, shall employ services of approved Audio Visual Contractor as subcontractor to perform Work described herein.
2. Be experienced in installations of similar size and scope within last five years. Upon request, submit list of 4 (minimum) installed jobs of similar magnitude, completed within last five years. For verification, submit complete information, including project name, project address, contact person, and daytime telephone number. At Owner's request, accompany Owner or Owners representative on visit to any or all example completed projects submitted.

3. Be Authorized Dealer for major lines of equipment provided. Must have at least one permanent staff member who is factory trained in the installation and maintenance of each major product line offered.
4. Employ personnel (at all levels of work) experienced in projects of similar scope and size. Upon request, provide list of key personnel to be responsible for each of the following aspects of work: Project Management, Technical Documentation, and Leadership of Field Work (one who is present for all field work). For each identified employee, indicate number of years employed by contractor, number of years experience in assigned responsibilities, and list of previously completed projects where similar responsibilities were required.
5. Project manager assigned to this project must have a minimum of 5 years experience in installing and integrating audio visual systems. If project manager has less than 5 years experience, project manager then must have a minimum of 3 years experience in installing and integrating audio visual systems and an ICIA-CTS certification.

B. Codes - Execute work in accordance with standard sound, video and system installation practices, National Electrical Code, and applicable state and local codes.

C. Testing Standards - Perform testing in accordance with ANSI standards. Applicable standards include the following.
1. ANSI S1.4-1983 - Specifications for Sound Level Meters
2. ANSI S1.40-1984 - Specifications for Acoustic Calibrators
3. ANSI S1.11-1986 - Specifications for Octave-Band and Fractional Octave-Band Analog and Digital Filters.
4. ANSI PH7.201-1983 - Method for Measuring Screen Illumination of Front Projection Audio-Visual Equipment.
5. EIA RS-250C - Short haul audio and video transmission standards.

D. Regulations — For spaces other than religious places of worship, comply with terms and conditions of Americans With Disabilities Act, especially regarding provisions for hearing impaired and wheelchair access in control area.

E. Rigging - Use precautions when lifting and attaching equipment overhead. Select mounting or lifting hardware to provide safety factor meeting or exceeding project value (minimum safety factor of 5). Provide attachment hardware rated SAE Grade 5 minimum. Lag screws or formed eye bolts not acceptable. Verify load ratings of hanging components, including attachment details, on Shop Drawings reviewed by Structural Engineer licensed to practice in the State of Texas. Execute attachments, attachment points reinforcements, and hardware selection in accordance with following references.
1. Newberry, W. G., - Handbook for Rippers, 1977 Revised Edition, Calgary, Alberta Canada "Basic Principals for Suspended Loudspeaker Systems," Technical Notes Volume 1, Number 14, JBL Professional, Northridge, California

1.5 STORAGE AND HANDLING

A. Damage Prevention - Ensure that materials (especially electronic and electro-acoustic devices) are protected against physical, environmental, and electronic damage during transport to and installation at job site.

B. Magnetic Materials Handling - Take special precautions with magnetic devices. Keep temperature during storage and delivery below 110 degrees Fahrenheit. Keep devices with magnetic fields (loudspeakers, microphones, etc.) away from magnetic storage media (computers, floppy disks, cassette tapes, etc.), especially in common storage area.

C. Materials Acceptance - Coordinate with Owner for acceptance of materials and labor at job site.

D. Storage Location - Coordinate storage location at job site or designated storage area at contractor warehouse.

E. Storage Protection - Provide storage protection against temperature and humidity extremes, theft, vandalism, physical damage, and environmental damage.

PART 2- PRODUCTS

2.1 GUIDELINES

A. Design Parameters - System design is around products listed in Part Two. Intent of product specification is to provide standard of quality and function for installed materials. Certain performance specifications are given to clarify job requirements. No substitutions will be allowed without prior approval specific to proposed manufacturer and model numbers.

B. Performance - Regardless of completeness of descriptive paragraphs herein, each device shall meet its manufacturer's published specifications. Verify performance.

C. Quantities - Quantities given in specifications are for reference only; confirm quantities prior to installation. If Contract Documents do not include quantities necessary to deliver complete working system, provide notification of disparity, and install required quantity of devices for complete working system.

D. Balanced Lines - Unless specifically directed otherwise, wire all line and microphone level circuits as balanced with respect to signal ground. For products without balanced inputs or outputs, provide high quality balancing transformers by Jensen or ProCo with proper level, shielding, and impedance characteristics. Assure all audio levels arrivinq and leavinq matrix and routing switchers are equal to the manufacture's recommended input audio level for the GE/Fiber Options fiber optic audio/video transmission interface. If required, use RDL amps for level matching.

E. Small Parts - Systems are described in terms of major products. Even if not specifically mentioned, provide and install patch cables, connectors, hardware, labels, terminals, etc. necessary for complete and working system meeting design intent of specifications. Install shaft locks or security covers on rack-mounted equipment not normally adjusted by user.

F Keys - Provide 5 sets of keys for any Audio Visual system product requiring keys.

G. Condition - Provide and install products listed in this section in factory new condition, conforming to applicable provisions of American National Standards Institute.

H. Designations - Each major product item is given unique designation (such as MIX-1 for mixer number 1). The product designations are unique in this section only and may be repeated in other specification sections.

2.2 CONFERENCE ROOMS AV RACK PRODUCTS — AV CONTROL ROOM 8.3054

A. AV Rack Electrical Power- Coordinate with Electrical Contractor regarding proper placement of isolated-ground duplex outlets on walls of the AV Booth Area. Electrical circuits should be connected (and outlets wired) by the Electrical Contractor to the AV system circuit breaker panel (N.I.C.). Ensure that "Star" ground configuration is properly implemented by the Electrical Contractor. Ensure that ground wires from each outlet are isolated from conduit, neutrals, and each other, and are each "home-run" back to the dedicated breaker panel for AV systems.

B. Equipment Rack (AVRK-1 and AVRK-2) - Middle Atlantic WRK 24SA 27 WRK-44-27 equipment rack with FD 24 solid front door, SPN 24 312 SPN-44-27 side panels, MW-ST top and CBS-WRK-27 caster base (quantity: 2). Provide new, and install as shown in drawings. Provide and install new blank and vent panels to match equipment rack. Fill rack spaces reserved for future equipment with blank panels.

C. Equipment Rack (AVRK-3) - Middle Atlantic WRK-44-32 equipment rack with FD-44 solid front door, SPN-44-32 side panels, MW-ST top and CBS-WRK-32 caster base (quantity: 1). Provide new, and install as shown in drawings. Provide and install new blank and vent panels to match equipment rack. Fill rack spaces reserved for future equipment with blank panels.

D. Pull-Out Rack Shelf - Middle Atlantic SS heavy-duty sliding shelf (quantity: 2) capable of latching at

the "out" or "in" positions. Provide new, and install in AV Rack as shown in drawings for use with setup and maintenance equipment

E. RGBHV 1 Stereo Audio Matrix Switcher (VSW-2) - Extron Crosspoint 1616HVA (quantity: 1) 16x16 RGBHV and stereo audio matrix switcher with RS232 control capabilities. RGBHV / Stereo Audio Matrix Switcher (VSW-2A, VSW-2B and VSW-2C) - Extron TPX 88 A (quantity: 3) 8x8 Twisted Pair (TPX) Switcher with Local Audio Outputs. RGBHV and RS232 control capabilities. Install with in AV Racks and integrate into system as shown in drawings.

F. UTP Twisted Pair RGBHV / Balanced Stereo Audio Transmitter (UTPT-1) - Extron TP-T-I5HD-A UTP transmitter with 15-pin HD computer video input and 3.5mm stereo audio mini jack. Install with in AV Racks and integrate into system as shown in drawings.

G. UTP Twisted Pair RGBHV / Balanced Stereo Audio Receiver (UTPR-1) - Extron TP-R-15HD-A UTP transmitter with 15-pin HD computer video output and captive screw connector for balanced stereo audio output. Install with in AV Racks and integrate into system as shown in drawings.

H. Composite Video 1 Stereo Audio Matrix Switcher (VSW-1) - Extron MAV3232 (quantity: 1) 32x32 composite video and stereo audio matrix switcher with RS232 control capabilities. Switcher to have a minimum bandwidth of 435 MHz. (-3dB) fully loaded. Install with in AV Racks and integrate into system as shown in drawings.

I. S-VHS VCR (VCR-1, VCR-2, VCR-3, and VCR-4) - JVC SR-V10U S-VHS VCR (quantity: 4). Provide new with rack mount kit. Install in AV Racks and integrate into system as shown in drawings.

J. Control System Mainframe (CONTROL-1) - AMX NXF Cardframe with Netlinx NXC-ME260 master processor card (quantity: 1) and PSN6.5 power supply (quantity: 1). Provide with control cards as necessary to interface to devices identified on drawings. Also provide control for all Conference Room projection screens and Lutron house lighting system. The General Contractor, as part of the conference lighting system will provide two Lutron GRX-RS-232 interfaces for lighting control and movable partition status. Provide power sensors for any equipment without true 2-way RS-232. Owner and AV Contractor to coordinate all touch panel layouts. Owner to provide a copy of standard Touch Panel pages for reference. AV Contractor to provide all source code. AV Contractor to provide web-control using AMX Netlinx controller internal web interface. Provide web-control for each Touch Panel in AV system. Include page tracking between Touch Panel and web-control panel. AV Contractor to provide to Owner all files, program blocks and other related files used to develop control program. AV Contractor to provide final loaded control program and touch panel layouts on CD-R and printed format. Program touch panels to provide simple, intuitive control of all video / RGBHV source and destination routing assignments, audiovisual system power (including projector power), and VCR transport functions as directed by Owner. Include screen layout and menu branching drawings in submittals. Provide new and install with rack mount kit in AV Racks and integrate into system as shown in drawings.

K. Automatic Mixer/Matrix (MIX-1 through MIX-4) - AKG automatic mixer/matrix (quantity: 4) with 16 x 12 router. Unit to controllable via RS-232. Provide new, install in AV rack, and integrate into system as shown in drawings.

L. Wireless Lavaliere Microphone System (WM-1 through WM-4) - Sennheiser EW312 300 series body pack system including four receivers and four bodypack transmitters, and four omnidirectional lavaliere microphones. Provide all new. Install receiver in AV Racks as shown in drawings. Coordinate frequency selection with other radio-frequency sources in the area and with manufacturer's recommendations. Deliver transmitter, microphone, accessories, and unused batteries (for transmitters) to Owner following Final Tests and Adjustments. Provide additional batteries for using during tests and adjustments. Provide new, install in AV rack, and integrate into system as shown in drawings.

M. Wireless Microphone Active Antenna Distribution and Powered Antenna System (WDA-1) - Sennheiser EWANT4R active antenna distribution with powered antenna system (quantity: 1). AV contractor to conduct frequency scan of Conference Room area and provide Consultant and Owner results prior to ordering wireless microphone systems. Install

antenna over Conference Room area. Test performance of wireless systems while transmitters are walked around all of the Conference Room area. If reliable performance (without dropout or interference) cannot be obtained with antennas mounted n initial positions, then relocate antennas. Propose new locations to Owner or Consultant, relocate antennas with necessary cabling, and retest. Relocate a second time if necessary. Provide new, and install as shown in drawings.

N. Audio Amplifier (PA-1, PA-2, PA-3 and PA-4) - QSC CX-302 amplifier (quantity: 4). Provide new, install in AV rack, and integrate into system as shown in drawings.

O. Scan Converter (SCAN-1) Extron VSC 500 (quantity: 1). Provide new, install in AV rack, and integrate into system as shown in drawings.

P. Audio Mixer/Combiner (AC-1 through AC-16) — Radio Design Labs ST-U MX3 (quantity: 16) universal audio mixer with three balanced microphone/line level inputs, and one balanced microphone/line level output. Provide manufacturer recommended ground-referenced 24 VDC power supplies. Provide new, install in AV rack, and integrate into system as shown in drawings.

Q. Audio Distribution Amplifier (ADA-1 through ADA-8) — Radio Design Labs ST-DA3 audio distribution amplifier (quantity: 8), with one balanced line level input, and three balanced line level outputs. Provide manufacturer recommended 24 VDC power supplies. Provide new, install in AV rack, and integrate into system as shown in drawings.

R. Composite Video with Balanced Stereo Audio Auxiliary Input/Output Panel (ARP-1) - Custom rack panel with connectors as shown in drawings. Provide new, install in AV rack, and integrate into system as shown in drawings.

S. RGBHV with Balanced Stereo Audio Auxiliary Input Panel (ARP-2) — Custom rack panel with connectors as shown in drawings. Provide new, install in AV rack, and integrate into system as shown in drawings.

T. RGBHV with Balanced Stereo Audio Auxiliary Output Panel (ARP-3) — Custom rack panel with connectors as shown in drawings. Provide new, install in AV rack, and integrate into system as shown in drawings.

U. Connectors – Connectors to be of the quantity and type as required for proper and durable operation and signal transmission of the electrical characteristics for associated circuitry. Microphone connectors: 3-conductor XLR type. Control panels: XLR type with number of conductors as required. Line level and left/right audio connectors: tip/ring/sleeve 1/4" phone jacks with insulated bushings. Composite video and RGBS connectors: BNC dual crimp 75 ohm Canare or accepted substitution. S-video: standard 4-pin S-video mini-din. Triaxial Video Connectors: Kings Electronics 7703-3 and 7703-7. NOTE: Provide Genlock cabling and connectors for all equipment with Genlock.

V. Interconnect Wiring – Provide and install following cable as required for connections in all areas. Provide required plenum rated bridal reigns and plenum ties. Meet provisions of N.E.C.
Audio Plenum Rated Cable: West Penn 25452, West Penn 25291, or similar.
Composite Video Plenum Rated Cable: West Penn 25806P.
RGBHV Plenum Rated Cable: _ West Penn 258195 or
Belden 1826A or Liberty RGB5C-SD-PLN.
RGBHV UTP Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free AN UTP
Control Plenum Rated Cable: #20 AWG jacketed containing proper number of conductors.
Control CAT-5 Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free A/V UTP.
Triaxial Camera Plenum Rated Cable: Belden 1859A.
Loudspeaker plenum cable: West Penn 25226.

W. RGBHV Patch Cables – Extron BNC-5 3' RC five BNC to five BNC patch cables (quantity: 4). Provide new.

2.3 FIELD PRODUCTS- CONFERENCE ROOMS PROJECTION PRODUCTS

A. Conference Room Video / Data Projector (VDP-3) - Sharp XG-V10XU with Buhl 732MCZ151 7.38" to 12.3" manual zoom lens (quantity: 2). Video/data projector for full room configuration with 4000 ANSI lumen light output. Provide new with ceiling mount, and adjust for optimum projected image quality and integrate into system as shown in drawings.

B. Conference Room Video 1 Data Projector (VDP-2) - Sharp XG-%.15-OX XG-V55X with Buhl 633MCZ500 2.75" to 5" manual zoom lens (quantity: 8). Video/data projector for 1/8 room configuration with 3000 ANSI lumen light output. Provide new with ceiling mount, and adjust for optimum projected image quality and integrate into system as shown in drawings.

C. Conference Room Video / Data Projector Mount (MNT-1) - Chief LCD-2TS, LCDB base, CMA-014 pole and LCDPA mounting assembly (quantity: 8). Provide new, and adjust for optimum projected image quality and integrate into system as shown in drawings.

D. Owner Provided Front Projection Screen (SC-2) Draper Access/Series V 96"x 72" electric tab-tensioned electric projection screen with M1300 matte white surface and extra 8 foot black drop at top with low voltage control (quantity: *8). Provided and installed by the General Contractor.*

E. Owner Provided Front Projection Screen (SC-3) Draper Access/Series V 144" x 108" electric tab-tensioned electric projection screen with M1300 matte white surface and extra 6 foot black drop at top with low voltage control (quantity: 2). *Provided and installed by the General Contractor.*

F. Owner Provided Front Projection Screen (SC-4) Draper Pinnacle 16' 8" x 12' 6" electric projection screen with matte white surface and low voltage control (quantity: 1). *Provided and installed by the General Contractor.*

G. Interconnect Wiring – Provide and install following cable as required for connections in all areas. Provide required plenum rated bridal reigns and plenum ties. Meet provisions of N.E.C.
Audio Plenum Rated Cable: West Penn 25452, West Penn 25291, or similar.
Composite Video Plenum Rated Cable: West Penn 25806P.
RGBHV Plenum Rated Cable: _ West Penn 258195 or
Belden 1826A or Liberty RGB5C-SD-PLN.
RGBHV UTP Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free AN UTP
Control Plenum Rated Cable: #20 AWG jacketed containing proper number of conductors.
Control CAT-5 Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free A/V UTP.
Triaxial Camera Plenum Rated Cable: Belden 1859A.
Loudspeaker plenum cable: West Penn 25226.

H. Conference Room Video / Data Projector UTP Receiver (UTPR-1) - Extron TP R BNC twisted pair to RGBHV BNC receiver (quantity: 10). Provide new and integrate into system as shown in drawings.

2.4 FIELD PRODUCTS - CLASSROOM PROJECTION PRODUCTS

A. Classroom Video I Data Projector (VDP-4) Sharp XG-055X with Sharp standard zoom lens (quantity: 1). Video/data projector for full room configuration with 3000 ANSI lumen light output. Provide new with ceiling mount, and adjust for optimum projected image quality and integrate into system as shown in drawings.

B. Owner Provided Front Projection Screen (SC-5) Draper Pinnacle 240" x 90" electric tab-tensioned electric projection screen with matte white surface and low voltage control (quantity: 1). *Provided and installed by the General Contractor.*

C. Desk Mount Control System Touch Panel (CP-5)- AMX AXT-CP4 4-inch color touch control panel (quantity: 1). Owner and AV Contractor to coordinate all touch panel layouts. Program each panel to provide simple, intuitive control of all video / RGBHV source and destination routing assignments, audiovisual system power (including projector power), and VCR transport functions. Include screen design and menu branching drawings in submittals. Provide new, and integrate into system as shown in drawings.

D. Interconnect Wiring – Provide and install following cable as required for connections in all areas.

Provide required plenum rated bridal reigns and plenum ties. Meet provisions of N.E.C.
Audio Plenum Rated Cable: West Penn 25452, West Penn 25291, or similar.
Composite Video Plenum Rated Cable: West Penn 25806P.
RGBHV Plenum Rated Cable: _ West Penn 258195 or
Belden 1826A or Liberty RGB5C-SD-PLN.
RGBHV UTP Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free AN UTP
Control Plenum Rated Cable: #20 AWG jacketed containing proper number of conductors.
Control CAT-5 Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free A/V UTP.
Triaxial Camera Plenum Rated Cable: Belden 1859A.
Loudspeaker plenum cable: West Penn 25226.

2.5 FIELD PRODUCTS—CONFERENCE ROOMS

A. Floor Pocket (FP-1 through FP-24) - 24 FSR FL-640P-B-6 floor pocket assemblies *provided and installed by Electrical Contractor.* Electrical Contractor will also provide and install one electrical power outlet within each of these Floor Pockets. Provide custom insert plates for each designated AV Floor Pocket (quantity: 2 plates each in AV Floor Pockets, 32 total plates) with low-voltage connectors and engraving as shown in drawings. Provide all low-voltage wiring, and install insert plates as shown in drawings.

B. Floor Box Computer Interface Plate (SAV-C12) Extron TP T 460 Twisted Pair Interface Transmitter with female 15-pin HD computer connector and with balanced stereo audio input (Quantity: 12). Provide new, and integrate into system as shown in drawings.

C. Camera (CAM) - Axis 2100 1-chip analog CCD web camera with auto focus (quantity: 8). Provide grommet at interface plate. Install new, at wall with wall bracket, where shown on drawings.

D. Wall Mounted Control System Touch Panel (WCP-1) - AMX AXD-CP4/A 4-inch color passive touch panel with 6 fixed external backlit illuminated pushbuttons (quantity: 8). Owner and AV Contractor to coordinate all touch panel layouts. Program each panel to provide simple, intuitive control of all video/ RGBHV source and destination routing assignments, audiovisual system power (including projector power), and VCR transport functions. Include screen design and menu branching drawings in submittals. Locate at wall plate WP-C. Provide new and integrate into system as shown in drawings.

E. Ceiling Loudspeakers (S) - JBL Control 26CT ceiling mounted 6.5 inch, two-way, loudspeakers with 70-volt transformer (quantity: as shown on drawings). Loudspeakers to have switchable taps at 60, 30 and 15 watts. Provide new and integrate into system as shown in drawings.

F. Small Desk Mount Control System Touch Panel (CP-2) - AMX NXT-CV7 7-inch color video touch control panel (quantity: 1). Owner and AV Contractor to coordinate all touch panel layouts. Program each panel to provide simple, intuitive control of all video/RGBHV source and destination routing assignments, audiovisual system power (including projector power), and VCR transport functions. Include screen design and menu branching drawings in submittals. Provide new, and integrate into system as shown in drawings.

G. Large Desk Mount Control System Touch Panel (CP-3)- AMX NXT-CV15 15-inch color video touch control panel (quantity: 1). Owner and AV Contractor to coordinate all touch panel layouts. Program each panel to provide simple, intuitive control of all video/RGBHV source and destination routing assignments, audiovisual system power (including projector power), and VCR transport functions. Include screen design and menu branching drawings in submittals. Provide new, and integrate into system as shown in drawings.

H. Triaxial Camera Interface Plate (CAM-2)- Kings Triaxial Connector on Custom Plate (quantity: as shown on drawings). Run plenum rated Triaxial cable into center of AV Rack Room, with a minimum of 20-feet of extra cable. Provide new and integrate into system as shown in drawings.

I. Cabinet Mounted S-VHS VCR (VCR-8 through VCR-15) - JVC SR-V1OU S-VHS VCR (quantity: 8). Mount in cabinet as indicated on drawings. (Designated as VCR in AV plan drawing) Provide new, and integrate into system as shown in drawings.

J. Multi-Media Lectern (ML-1) -Van San Custom #3 Multimedia lectern or similar (quantity: 4). Finish to

wood, stained to match millwork in Conference Rooms. Mount equipment identified below into lectern.

K. Multi-Media Lectern Gooseneck Microphone - AKG GN50 20-inch gooseneck and AKG CK31 Cardioid capsule (quantity:8)._ Provide 15-foot ProCo AmeriQuad quad standard microphone cable (quantity:8). Provide new, and integrate into system as shown in drawings.

L. Multi-Media Lectern Control Touch Panel (CTLP-1) AMX NXD-CV7 color video touch control panel uitive control of all video/RGBHV source and destination routing assignments, audiovisual system power (including projector power), and VCR transport functions. Include screen design and menu branching drawings in submittals. Provide new, and integrate into system as shown in drawings.

M. Multi-Media Lectern Video Switcher (VSW-4) 0Extron SW4AV (quantity: 4) four input composite video with balanced stereo audio switcher. Provide new, and integrate into system as shown in drawings.

N. Multi-Media Lectern VGA Switcher (VSW-5) - Extron SW4 VGA Ars (quantity: 4) four input VGA with balanced stereo audio switcher. Provide new, and integrate into system as shown in drawings.

O. Multi-Media Lectern S-VHS VCR (VCR-7) - JVC SR-V1OU S-VHS VCR (quantity: 4). Provide new with rack mount kit. Install in AV Racks and integrate into system as shown in drawings.

P. Connectors - Connectors to be of the quantity and type as required for proper and durable operation and signal transmission of the electrical characteristics for associated circuitry. Microphone connectors: 3-conductor XLR type. Control panels: XLR type with number of conductors as required. Line level and left/right audio connectors: tip/ring/sleeve 1/4" phone jacks with insulated bushings. Composite video and RGBS connectors: BNC dual-crimp 75 ohm Canare or accepted substitution. S-video: standard 4-pin S-video mini-din. Triaxial Video Connectors: Kings Electronics 7703-3 and 7703-7.

Q. Interconnect Wiring – Provide and install following cable as required for connections in all areas. Provide required plenum rated bridal reigns and plenum ties. Meet provisions of N.E.C.
Audio Plenum Rated Cable: West Penn 25452, West Penn 25291, or similar.
Composite Video Plenum Rated Cable: West Penn 25806P.
RGBHV Plenum Rated Cable: _ West Penn 258195 or
Belden 1826A or Liberty RGB5C-SD-PLN.
RGBHV UTP Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free AN UTP
Control Plenum Rated Cable: #20 AWG jacketed containing proper number of conductors.
Control CAT-5 Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free A/V UTP.
Triaxial Camera Plenum Rated Cable: Belden 1859A.
Loudspeaker plenum cable: West Penn 25226.

R. Multi-Media Lectern Cable Cubby - Extron 300 Series Cable Cubby (quantity: 4) with cables/connectors as shown in drawings. Provide new, install in lectern rack and integrate into system as shown in drawings.

S. Multi-Media Lectern Microphone Mixer (MLMM) - Radio Design Labs ST-UMX3 (quantity: 4). Stick-on series 3 microphone input, to microphone output level mixer. Use Radio Design Labs ground-referenced power supply (quantity: 4). Install in Lectern rack and integrate into system as shown in drawings.

T. Multi-Media Lectern Integrated Control System (LIC-1) - AMX NI-2000 integrated control system. (quantity: 4). Install in Lectern rack and integrate into system as shown in drawings.

2.6 FIELD PRODUCTS—CLASSROOM

A. Floor Pocket (FP-101) - FSR FL-640P-B-6 floor pocket assemblies *provided and installed by Electrical Contractor.* Electrical Contractor will also provide and install one electrical power outlet within each of these Floor Pockets. Provide custom insert plates for each AV Floor Pocket (quantity: 2 plate each in Floor Pocket, 2 plates) with low-voltage connectors and engraving as shown in drawings. Provide all low-voltage wiring, and install insert plates as shown in drawings.

B. Floor Box Computer Interface Plate (SAV C12) Extron RGB 460X1 computer interface plate with balanced stereo audio input (quantity: 1). Provide new, and integrate into system as shown in

drawings.

C. Wall Mounted Control System Touch Panel (WCP-1) - AMX AXD-CP4/A 4-inch color passive touch panel with 6 fixed external backlit illuminated pushbuttons (quantity: 1). Owner and AV Contractor to coordinate all touch panel layouts. Program each panel to provide simple, intuitive control of all video/RGBHV source and destination routing assignments, audiovisual system power (including projector power), and VCR transport functions. Include screen design and menu branching drawings in submittals. Locate at wall plate WP-C. Provide new and integrate into system as shown in drawings.

D. Loudspeakers (S2) -JBL Control 26CT two-way, loudspeakers with 70-volt transformer and wall mount (quantity: as shown on drawings). Loudspeakers to have switchable taps at 60, 30 and 15 watts. Loudspeakers to be hung from structural deck below Classroom lighting arid. Paint entire assembly flat black prior to installation. Provide new and integrate into system as shown in drawings.

E. Multi-Media Lectern (ML-2) Van San Custom #3 Wide Multimedia lectern. (Quantity 1) Finish to wood, stained to match millwork in Classroom. Mount equipment identified below into lectern.

F. Gooseneck Microphone - AKG GN50 20-inch gooseneck and AKG CK31 Cardioid capsule (quantity: 1-) (quantity: 2). Provide 15-foot ProCo AmeriQuad quad standard microphone cable may: 1-) (quantity: 2). Provide new, and integrate into system as shown in drawings.

G. Multi-Media Lectern S-VHS VCR (VCR-7) — JVC SR-V1OU S-VHS VCR (quantity: 1). Provide new with rack mount kit. Install in AV Racks and integrate into system as shown in drawings.

H. Connectors - Connectors to be of the quantity and type as required for proper and durable operation and signal transmission of the electrical characteristics for associated circuitry. Microphone connectors: 3-conductor XLR type. Control panels: XLR type with number of conductors as required. Line level and left/right audio connectors: tip/ring/sleeve 1/4" phone jacks with insulated bushings. Composite video and RGBS connectors: BNC dual-crimp 75 ohm Canare or accepted substitution. S-video: standard 4-pin S-video mini-din. Triaxial Video Connectors: Kings Electronics 7703-3 and 7703-7.

I. Interconnect Wiring – Provide and install following cable as required for connections in all areas. Provide required plenum rated bridal reigns and plenum ties. Meet provisions of N.E.C.
Audio Plenum Rated Cable: West Penn 25452, West Penn 25291, or similar.
Composite Video Plenum Rated Cable: West Penn 25806P.
RGBHV Plenum Rated Cable: _ West Penn 258195 or
Belden 1826A or Liberty RGB5C-SD-PLN.
RGBHV UTP Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free AN UTP
Control Plenum Rated Cable: #20 AWG jacketed containing proper number of conductors.
Control CAT-5 Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free A/V UTP.
Triaxial Camera Plenum Rated Cable: Belden 1859A.
Loudspeaker plenum cable: West Penn 25226.

J. Multi-Media Lectern Integrated Control System (LIC-3) - AMX NetLinx NI-2000 integrated control system. System to control projection screen, lectern VCR, lectern mixer/amp and 6 room Lutron Grafik eve liqhtinq presets. Configure 4-inch wall panel pages to control, at a minimum, projector power on/off, projector input select, mixer/amp microphone level control (speech volume), mixer/amp VCR level control (proqram volume). Include macro buttons such as "Project Computer", which will power on projector, switch projector to computer input and set proqram volume at a preset (i.e. 70%) and launch presentation liqhtinq preset, and "Project VCR", which will power on projector, switch projector to video input and set proqram volume at a preset (i.e. 70%) and launch presentation liqhtinq preset. Provide new with rack mount kit and power supply.

K. Multi-Media Lectern Mixer/Amplifier (MAMP-1)- Tascam AV-452 microphone/line level mixer and 100 watt per channel amplifier (quantity:-1). Unit to be RS-232/422/485 controllable. Provide new, and integrate into system as shown in drawings.

2.7 FIELD PRODUCTS - CONFERENCE ROOMS PORTABLE EQUIPMENT

A. Basic Lectern (BL-1) -Van San Series 100 lectern or similar (quantity: 4) with light and clock. Finish to wood, stained to match millwork in Conference Rooms.

B. Basic Lectern Gooseneck Microphone - AKG GN50 20-inch gooseneck and AKG CK31 Cardioid capsule (quantity: 4). Provide 15-foot ProCo AmeriQuad quad standard microphone cable (quantity: 4). Provide new, and integrate into system as shown in drawings.

C. Wired Handheld Microphone with Shock-Mount and Tripod Stand - Shure SM58 Cardioid handheld microphone (quantity: 4). Provide K&M 201A/2B tripod microphone stand in black with K&M 211/2B 38-inch collapsible boom in black (quantity: 4). Provide Shure S39A vibration isolated desk stand (quantity: 4). Provide 25-foot ProCo AmeriQuad quad standard microphone cable (quantity: 4). Provide new.

D. VGA interface cables - Extron male-to-male 6-foot VGA with 3.5mm stereo mini audio cable (quantity: 4) model 26-490-02. Provide new.

E. Video interface cables - Extron 6-foot RG6/SHR-1 12-foot bnc-to-bnc (quantity: 4) model 26-383-07. Provide new.

2.8 ALTERNATE 1 **-** CLASSROOM AV RACK PRODUCTS - AV CONTROL ROOM 8.3054

A. AV Rack Electrical Power- Coordinate with Electrical Contractor regarding proper placement of isolated-ground duplex outlets on walls of the AV Booth Area. Electrical circuits should be connected (and outlets wired) by the Electrical Contractor to the AV system circuit breaker panel (N.I.C.). Ensure that "Star" ground configuration is properly implemented by the Electrical Contractor. Ensure that ground wires from each outlet are isolated from conduit, neutrals, and each other, and are each "home-run" back to the dedicated breaker panel for AV systems.

B. Equipment Rack (AVRK-4) - Middle Atlantic WRK-44-32 equipment rack with FD-44 solid front door, SPN-44-32 side panels, MW-ST top and CBS-WRK-32 caster base (quantity: 1). Provide new, and install as shown in drawings. Provide and install new blank and vent panels to match equipment rack. Fill rack spaces reserved for future equipment with blank panels.

C. Pull-Out Rack Shelf - Middle Atlantic SS heavy-duty sliding shelf (quantity: 1) capable of latching at the "out" or "in" positions. Provide new, and install in AV Rack as shown in drawings for use with setup and maintenance equipment

D. RGBHV / Composite Video! Stereo Audio Matrix Switcher (VSW-7) - Extron Crosspoint 1616HVA (quantity: 1) 16x16 RGBHV and stereo audio matrix switcher with RS232 control capabilities. Switcher to have a minimum bandwidth of 325 MHz. (-3dB) fully loaded. Install with in AV Racks and integrate into system as shown in drawings.

E. S-VHS VCR (VCR-5 and VCR-6) - JVC SR-V10U S-VHS VCR (quantity: 2). Provide new with rack mount kit. Install in AV Racks and integrate into system as shown in drawings.

F. Control System Mainframe (CONTROL-2) - AMX NXF Cardframe with NetLinx NXC-ME260 master processor card (quantity: 1) and PSN6.5 power supply (quantity: 1). Provide with control cards as necessary to interface to devices identified on drawings. Also provide control for projection screen and Lutron house lighting system. Provide power sensors for any equipment without true 2-way RS-232. The General Contractor, as part of the conference lighting system will provide one Lutron GRX-RS-232 interface for lighting control. Owner and AV Contractor to coordinate all touch panel layouts. AV Contractor to provide all source code. AV Contractor to provide to Owner all files, program blocks and other related files used to develop control program. AV Contractor to provide final loaded control program on CD-R and printed format. Program touch panels to provide simple, intuitive control of all video / RGBHV source and destination routing assignments, audiovisual system power (including projector power), and VCR transport functions as directed by Owner. Owner to provide a copy of standard Touch Panel pages for reference. AV Contractor to provide web-control using AMX NetLinx controller internal web interface. Provide web-control for each Touch Panel in AV system. Include page tracking between Touch Panel and web-control panel. Provide automated selection of a minimum of 48 video camera presets of shots of audience participants via table microphone activation button via AMX 10 cards and confirmation of active

microphone states via Gentner XAP system RS-232 strings. Include screen layout and menu branching drawings in submittals. Provide new and install with rack mount kit in AV Racks and integrate into system as shown in drawings.

G Teleconference Mixer/Router (MIX-5, MIX-6, MIX-7, MIX-8, MIX-9, MIX-10 and MIX-11) - Gentner XAP-800 teleconference mixer (quantity: 7) with echo cancellation for each microphone input, 12 x 12 router
and digital signal processing including limiters and equalizers for each input and output. Unit to controllable via RS-232. Provide new, install in AV rack, and integrate into system as shown in drawings.

H. Teleconference Mixer/Router/Telephone Interface (MIX-12) - Gentner)(AP-400 teleconference mixer (quantity: 1) with echo cancellation for each microphone input, 8 x 8 router and digital signal processing including limiters and equalizers for each input and output. Unit to have integrated telephone interface. Unit to be controllable via RS-232. Provide new, install in AV rack, and integrate into system as shown in drawings.

I. Wireless Lavaliere Microphone System (WM-5 and WM-6) - Shure U1245/BETA58 wireless BETA58 handheld and omni-directional lavaliere beltpack combo system (quantity: 1) with. Provide all new. Install receiver in AV Racks as shown in drawings. Coordinate frequency selection with other radio-frequency sources in the area and with manufacturer's recommendations. Deliver transmitter, microphone, accessories, and unused batteries (for transmitters) to Owner following Final Tests and Adjustments. Provide additional batteries for using during tests and adjustments. Provide new, install in AV rack, and integrate into system as shown in drawings.

J. Wireless Microphone Active Antenna Distribution and Powered Antenna System (WDA-2) - Shure UA 845US wideband VHF active antenna distribution with powered antenna system (quantity: 1). AV contractor to conduct frequency scan of Conference Room area and provide Consultant and Owner results prior to ordering wireless microphone systems. Install antenna above Classroom lighting grid. Test performance of wireless systems while transmitters are walked around all of the Classroom Room area. If reliable performance (without dropout or interference) cannot be obtained with antennas mounted n initial positions, then relocate antennas. Propose new locations to Owner or Consultant, relocate antennas with necessary cabling, and retest. Relocate a second time if necessary. Install with manufacturer recommended plenum rated cable. Provide new, and install as shown in drawings.

K. Audio Amplifier (PA-5 and PA-6) -QSC CX-204V series 70-volt four channel amplifier (quantity: 2). Provide new, install in AV rack, and integrate into system as shown in drawings.

L. Scan Converter (SCAN-1) Extron VSC 500 scan converter (quantity: 1). Provide new, install in AV rack, and integrate into system as shown in drawings.

M. Audio Mixer/Combiner (AC-1 through AC-8) - Radio Design Labs ST-UMX3 (quantity: 8) universal audio mixer with three balanced microphone/line level inputs, and one balanced microphone/line level output. Provide manufacturer recommended ground-referenced 24 VDC power supplies. Provide new, install in AV rack, and integrate into system as shown in drawings.

N. Audio Distribution Amplifier (ADA-1 through ADA-4) - Radio Design Labs ST-DA3 audio distribution amplifier (quantity: 4), with one balanced line level input, and three balanced line level outputs. Provide manufacturer recommended 24 VDC power supplies. Provide new, install in AV rack, and integrate into system as shown in drawings.

O. Connectors - Connectors to be of the quantity and type as required for proper and durable operation and signal transmission of the electrical characteristics for associated circuitry. Microphone connectors: 3-conductor XLR type. Control panels: XLR type with number of conductors as required. Line level and left/right audio connectors: tip/ring/sleeve 1/4" phone jacks with insulated bushings. Composite video and RGBS connectors: BNC dual crimp 75 ohm Canare or accepted substitution. S-video: standard 4-pin S-video mini-din. Triaxial Video Connectors: Kings Electronics . NOTE: Provide Genlock cabling and connectors for all equipment with Genlock.

P. Interconnect Wiring - Provide and install following cable as required for connections in all areas. Provide required plenum rated bridal reigns and plenum ties. Meet provisions of N.E.C.
Audio Plenum Rated Cable: West Penn 25452, West Penn 25291, or similar.

Composite Video Plenum Rated Cable: West Penn 25806P.
RGBHV Plenum Rated Cable: West Penn 258195 or Belden 1826A or Liberty RGB5C-SD-PLN. RGBHV UTP Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free AN UTP
Control Plenum Rated Cable: #20 AWG jacketed containing proper number of conductors. Control CATS Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free AN UTP.
Triaxial Camera Plenum Rated Cable: Belden 1859A.

Loudspeaker plenum cable: West Penn 25226.

2.9 ALTERNATE 1 **-** FIELD PRODUCTS - CLASSROOM

A. Floor Pocket (FP-101) - FSR FL-640P-B-6 floor pocket assemblies *provided and installed by Electrical Contractor.* Electrical Contractor will also provide and install one electrical power outlet within each of these Floor Pockets. Provide custom insert plates for each AV Floor Pocket (quantity: 1 plate each in Floor Pocket, 1 plate) with low-voltage connectors and engraving as shown in drawings. Provide all low-voltage wiring, and install insert plates as shown in drawings.

B. Floor Box Computer Interface Plate - Extron RGB 460X1 FSR computer interface plate with balanced stereo audio input (quantity: 2). Provide new, and integrate into system as shown in drawings.

C. Remote Video Camera, Lens, and Pan/Tilt Unit (CAM3) - Sony DXC-990 video camera with Canon YH 19x6.7 KTS 19x zoom lens, AMX AXB-PT30 Positrak 30 Pan/Tilt/Controller (quantity: 3) and AMX PSN6.5 Pan/Tilt 12-volt power supply (quantity: 3). Also provide Sony CMA-D2 camera power supply (quantity: 3), Sony CCMC-02 cable (quantity: 3), and AMX CC-CAM lens control cable (quantity: 3), and CC-CAM RS-232 control cable (quantity: 3). Provide grommet at interface plate. Provide new and integrate into system as shown in drawings.

D. Wall Mounted Control System Touch Panel (WCP-1) - AMX AXD-CP4JA 4-inch color passive touch panel with 6 fixed external backlit illuminated pushbuttons (quantity: 1). Owner and AV Contractor to coordinate all touch panel layouts. Program each panel to provide simple, intuitive control of all video 1 RGBHV source and destination routing assignments, audiovisual system power (including projector power), and VCR transport functions. Include screen design and menu branching drawings in submittals. Locate at wall plate WP-C. Provide new and integrate into system as shown in drawings.

E. Loudspeakers (S2) - JBL Control 26CT loudspeakers with 70-volt transformer (quantity: 8). Loudspeakers to have switchable taps at 60, 30 and 15 watts. Loudspeakers to be hung from structural deck below Classroom lighting grid. Paint entire assembly flat black prior to installation. Provide new and integrate into system as shown in drawings.

F. Desk Mount Control System Technical Touch Panel (CP-2)- AMX NXT-CV12 Modero 12-inch color video touch control panel (quantity: 1). Owner and AV Contractor to coordinate all touch panel layouts. Program each panel to provide simple, intuitive control of all video / RGBHV source and destination routing assignments, audiovisual system power (including projector power), and VCR transport functions. Owner to provide touch panel pages for reference. Include screen design and menu branching drawings in submittals. Provide new, install in AV rack, and integrate into system as shown in drawings.

G. Table Microphone and Microphone Activation Button (MIC) - AKG GN 50 Gooseneck with CK 31 cardioid capsule and ST-45 table stand with small c-clamps painted flat black for attachment to table lip (quantity: as shown on drawing). Provide microphone activation button for each participant (quantity: as shown on drawing) on front lip of Classroom tables. Button will be cabled to 10 control card in AV rack and programmed to provide active microphone and video camera preset launch. Provide detailed equipment list, programming and wiring scheme in AV system submittal for approval by Owner and AV Consultant. Provide new, and integrate into system as shown in drawings.

H. Intercom Plate (WP-4) - 6-gang plate with male XLR connectors. Install audio plenum rated cable from plate to AV racks and provide 20 feet of extra cable per cable run. Provide new.

I. Desk Mount Control System Presenter Touch Panel (CP-5) - AMX NXT-CV 12-inch Modero Color Video Table Top touch control panel (quantity: 1). Owner and AV Contractor to coordinate all touch panel layouts. Program each panel to provide simple, intuitive control of all video / RGBHV source and destination routing assignments, audiovisual system power (including projector power), and VCR transport functions. Owner to provide touch panel pages for reference. Include screen design and menu branching drawings in submittals. Provide new, and integrate into system as shown in drawings.

J. Triaxial Camera Interface Plate (CAM-2) - Kings Triaxial Connector on Custom Plate (quantity: as shown on drawings). Run plenum rated triaxial cable into center of AV Rack Room, with a minimum of 20—feet of extra cable. Provide new and integrate into system as shown in drawings.

K. Connectors - Connectors to be of the quantity and type as required for proper and durable operation and signal transmission of the electrical characteristics for associated circuitry. Microphone connectors: 3-conductor XLR type. Control panels: XLR type with number of conductors as required. Line level and left/right audio connectors: tip/ring/sleeve 1/4" phone jacks with insulated bushings. Composite video and RGBS connectors: BNC dual-crimp 75 ohm Canare or accepted substitution. S-video: standard 4-pin S-video mini-din. Triaxial Video Connectors: Kings Electronics. NOTE: Provide Genlock cabling and connectors for all equipment with Genlock.

L. Interconnect Wiring - Provide and install following cable as required for connections in all areas. Provide required plenum rated bridal reigns and plenum ties. Meet provisions of N.E.C.
Audio Plenum Rated Cable: West Penn 25452, West Penn 25291, or similar.
Composite Video Plenum Rated Cable: West Penn 25806P.
RGBHV Plenum Rated Cable: West Penn 258195 or Belden 1826A or Liberty RGB5C-SD-PLN. RGBHV UTP Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free AN UTP
Control Plenum Rated Cable: #20 AWG jacketed containing proper number of conductors. Control CATS Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free AN UTP.
Triaxial Camera Plenum Rated Cable: Belden 1859A.
Loudspeaker plenum cable: West Penn 25226.

2.10 ALTERNATE 1 **-** LECTERN PRODUCTS—CLASSROOM

A. Multi-Media Lectern (ML-3) -Van San Custom #3 Wide Multimedia lectern or similar (quantity: 1). Wood to be walnut or oak veneer. Finish to wood, stained according to Owner. Mount equipment identified below into lectern.

B. Multi-Media Lectern Gooseneck Microphone (LGM-1) - AKG GN50 20-inch gooseneck and AKG CK31 Cardioid capsule (quantity: 2). Provide 15-foot ProCo AmeriQuad quad standard microphone cable (quantity: 1). Provide new, and integrate into system as shown in drawings.

C. Multi-Media Lectern Control Touch Panel (CTLP-3) - AMX NTX-CV12 Modero 12-inch table top color video touch control panel (quantity: 1). Owner and AV Contractor to coordinate all touch panel layouts. Program each panel to provide simple, intuitive control of all video/RGBHV source and destination routing assignments, audiovisual system power (including projector power), and VCR transport functions. Include screen design and menu branching drawings in submittals. Provide new, and integrate into system as shown in drawings.

D. Multi-Media Lectern Cable Cubby (LCC-1) - Extron 300 series cable cubby (quantity: 2). with Extron interconnect cables as indicated in drawings. Provide new, and integrate into system as shown in drawings.

E. Multi-Media Lectern Video Switcher (VSW-4) - Extron SW4AV (quantity: 1) four input composite video with balanced stereo audio switcher. Provide new, and integrate into system as shown in drawings.

F. Multi-Media Lectern VGA Switcher (VSW-5) - Extron SW4 VGA Ars (quantity: 1) four input VGA with balanced stereo audio switcher. Provide new, and integrate into system as shown in drawings.

G. Multi-Media Lectern S-VHS VCR (VCR-L3) - JVC SR-V1OU S-VHS VCR (quantity: 1). Provide new

with rack mount kit. Install in Lectern and integrate into system as shown in drawings.

H. Multi-Media Lectern DVD Player (DVD-L3) - Denon DVD-1000P DVD player (quantity: 1). Provide new with rack mount kit. Install in Lectern and integrate into system as shown in drawings.

I. Multi-Media Lectern Integrated Control System (LIC-2) - AMX NI-3000 integrated control system. (quantity: 1). Install in Lectern rack and integrate into system as shown in drawings.

2.11 ALTERNATE 1 **-** FIELD PRODUCTS - CLASSROOM PROJECTION PRODUCTS

A. Classroom Video I Data Projector (VDP-1) - Sharp XG-V1OXU with Sharp AN-LV40EZ standard zoom lens (quantity: 2). Video/data projector with 4000 ANSI lumen light output for dual image projection. Provide new with Chief adjustable ceiling mount, install at structural deck, adjust for optimum projected image quality and integrate into system as shown in drawings.

B. Owner Provided Front Projection Screen (SC-5) Draper Pinnacle 240" x 90" electric tab-tensioned electric projection screen with matte white surface and low voltage control (quantity: 1). *Provided and installed by the General Contractor.*

C. Interconnect Wiring - Provide and install following cable as required for connections in all areas. Provide required plenum rated bridal reigns and plenum ties. Meet provisions of N.E.C.
Audio Plenum Rated Cable: West Penn 25452, West Penn 25291, or similar.
Composite Video Plenum Rated Cable: West Penn 25806P.
RGBHV Plenum Rated Cable: West Penn 258195 or Belden 1826A or Liberty RGB5C-SD-PLN. RGBHV UTP Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free AN UTP
Control Plenum Rated Cable: #20 AWG jacketed containing proper number of conductors. Control CATS Plenum Rated Cable: Extron 22-142-03 Plenum Skew Free AN UTP.
Triaxial Camera Plenum Rated Cable: Belden 1859A.
Loudspeaker plenum cable: West Penn 25226.

2.12 ALTERNATE 1 **-** FIELD PRODUCTS - CLASSROOM PORTABLE EQUIPMENT

A. Video Production AV Distribution Amplifier - Extron DA6-6-MX-DUAL (quantity: 1). Provide new.

B. Video Production Fiber Units - Broadata 280-TRx-S-D5-PL-FC Video/Audio/RS232 SMF Fiber Transceiver (quantity: 2). Provide new.

C. Television Production Fiber Units - Fiber Options/GE Model B748AV-T-RST1 (quantity: 2). Fiber Options/GE Model B748AV-R-RST1 (quantity: 2). Fiber Options/GE 502R wall mount cabinets (quantity: 4). Provide new.

D. Heads-up Plasma Display Monitor and Cart - Sony PFM42B2/H 42-inch plasma display (quantity: 1). Peerless PLCT rolling plasma cart with PS2 tilt mount (quantity: 1). Provide new.

PART 3 - Execution

3.1 INSTALLATION

A. General Guidelines
1. Quality of Work - Perform labor to accepted industry standards and state and local codes to accomplish complete and working system.
2. Material and Labor - Provide specified products and other incidental materials, appliances, tools, and transportation required for complete and functioning systems. Provide personnel to perform labor who are skilled in techniques and technical knowledge of sound and audio visual system installations.
3. Documents at Job Site - Keep following documents at job site during entire construction period. a. Complete Specifications and Drawings
b. Approved Shop Drawings
c. Approved Product Data

d. Progress Set of Project Record Documents

4. Mounting - Mount equipment and enclosures plumb and square. Ensure that permanently installed equipment is firmly and safely held in place. Design equipment supports to support loads imposed with project safety factor of 5 or greater. For devices hung overhead, obtain review by Structural Engineer licensed to practice in State of Texas.
5. Minor Equipment Moves - The process of equalizing and testing Audio Visual systems may necessitate moving and adjusting certain component parts such as loudspeakers. Perform requested minor moves during Final Tests and Adjustments without claim for additional payment.
6. Dimension Verification - Verify dimensions and space requirements to assure that proper mounting, clearance, and maintenance access space is available for system components.
7. Grommets - Cover edges of cable pass-through holes in chassis, rack, boxes, etc. with rubber grommets or Brad GRNY nylon grommets.
8. Future Maintenance Access — Install equipment rack and mixing consoles allowing access to rear connections by maintenance personnel without removal or disconnection of equipment. Install field devices and field wiring such that maintenance personnel can access terminations and splices without special equipment or disconnection of installed equipment.
9. Coordination - Coordinate work with other trades to avoid delays in construction schedule. Meet construction schedule.
10. Clean-Up - Leave project clean each day. Place debris where designated by General Contractor. Debris includes but not limited to: solder splatter, cable ends, stripped insulation, spent crimp connectors, gypsum board and ceiling tile dust, and product wrappings and cartons. After completion of installation, thoroughly clean areas worked, including non-visible areas such as equipment rack interiors, rack top panels, and inside lockable floor and wall boxes.

B. Labeling

1. Equipment Labels - Provide engraved lamicoid labels on front and rear of rack-mounted equipment. Mount labels plumb and square. Include schematic reference design, item name, and system or area controlled by labeled component. On program pre amps and mixers, provide label for each input indicating which source is controlled by labeled channel. Unless otherwise indicated, provide permanently-mounted black labels engraved with 118-inch white block characters. Handwritten, self-laminating, or embossed plastic (Dymo) labels are not acceptable. Provide labels for major equipment with 3 lines (minimum) of engraving, coded as follows.
   a. Line 1: Generic name of device, such as VIDEO MATRIX SWITCHER.
   b. Line 2: Schematic designation of device, such as AV-MSW-1.
2. Control Labels - Provide engraved label over each user-operated control that describes the function or purpose of control. Provide label of proper size to fit available space.
3. Terminal Strip Labels - Label each terminal strip with unique identification code in addition to numerical label (Cinch MS series) for each terminal. Show terminal strip codes on system schematic drawings included with Project Record Documents.
4. Rear Equipment Labels - Provide adhesive label on rear of equipment where cables attach, to indicate designation of cable connected at each point.
5. Cable and Wire Labels - Label cables and wiring logically, legibly and permanently for easy identification. Labels on cables to be adhesive strip type, covered with clear heat shrink tubing. Factory stamped heat shrink tubing may be used. Hand-written or self-laminating type labels are not acceptable.
6. Cable Label Codes and Locations - Label each cable with unique alpha-numeric code. Locate cable designation at start and end of each cable run, within 3 inches of termination point. For cable runs that have intermediate splice points, label cable with same designation throughout, with additional suffix to indicate each segment of run. Provide cable designation codes to schematic drawings included with Project Record Documents and Operation and Maintenance Manuals.

C. Power and Grounding

1. Power Coordination - Coordinate final connection of power and ground wiring to rack. Electrical contractor will provide power to sound and audio visual systems. Before installation, verify load requirements for systems as accepted.

2. Bus Bars - Install 1-inch by Y4-inch copper ground bus bar, top to bottom in each rack. Ground equipment chassis of each rack-mounted component without three-pin grounding plug to bus bars with #12 AWG insulated green wire using 6-32 or larger nuts, bolts, lock

washers, and appropriate connectors. Electrical Contractor to provide and connect #4 AWG green insulated wire to ground point in electrical panel.

D. Equipment Racks
1. Assembly- Mount, wire, and fully test equipment in racks.
2. Ventilation - Provide ventilation adequate to keep temperature **in** rack below 100 degrees Fahrenheit. Use "whisper" type ventilation fans in racks, adjusted to come on when temperature in rack rises above 100 degrees Fahrenheit, only if adequate cooling cannot be provided by Owner.
3. Rack Wiring - Wire equipment racks neatly, allowing proper slack for future serviceability. Looking from rear of equipment rack AR-4, locate power, digital control, DC control, and loudspeaker cables on right; and, locate microphone, line level audio on left. Maintain separate cable bundles for different types of signals. Do not bundle power cords permanently attached to equipment with other power cords. Do not block access to front-mounted equipment with equipment mounted to rear rack rails.

E. Wiring
1. Wiring Standards - Execute wiring in strict adherence to standard audiovisual engineering practices.
2. Field Connection Devices - Connect cable to active components through screw terminal connections and spade lugs when appropriate. For BNC connections use three piece, dual crimp BNC properly sized for cable with insulating bushings. Wire nut or "Skotchlock" connectors are not acceptable. Do not wrap audio cable splices or connections with adhesive backed tape. Punch connectors or telephone-style punch blocks are not acceptable anywhere in the installation unless specifically authorized by Consultant
3. Cable in ceiling plenums to be run neatly parallel to building walls, supported every three feet to structure.
4. Raceways - Run vertical wiring inside rack in Panduit (or equivalent) plastic raceways with snap-on covers, sized to allow at least 50% future wiring. Mount raceways on full length %-inch flat black plywood backboards, attached to rack sides. If between-rack wiring chases are provided, Panduit raceways are not required. Horizontal wiring in rack to be neatly tied in manageable bundles with cable lengths cut to minimize excess cable slack, but still allow for service and testing. Provide horizontal support bars if cable bundles sag. Individually bundle excess AC power cable away from rack mounted equipment with plastic cable ties. Electrical tape and adhesive backed cable tie anchors are not acceptable.
5. Terminal Blocks - Connect wiring entering equipment racks via terminal blocks (Cinch 140 or 142 series). Leave terminal blocks fully exposed and labeled, mounted on %-inch plywood painted flat black.
6. Accessibility - Ensure that wiring and connections are completely visible and labeled in rack. Mount termination resistors, if required, on terminal strips, fully visible and not concealed within equipment or connectors.
7. Loudspeaker Polarity - Connect loudspeakers electrically in phase, using same wire color for loudspeaker wiring throughout project.
8. Physical Damage Prevention - Take necessary precautions to prevent physical damage to cables and equipment. Damaged cables or equipment will not be accepted. Separate, organize, and route cables to restrict channel crosstalk and feedback oscillation.
9. Hum Prevention - Ensure that electromagnetic and electrostatic hum is at inaudible levels. For line level signals, float cable shields at the output of the source device. Do not cut or remove shield conductors; fold back unconnected shields over cable jacket and cover with clear heat-shrink tubing. Do not obstruct cable labels.
10. Other Connections - Make connections using rosin core solder or approved mechanical connectors. Where spade lugs are used, crimp properly with ratchet type crimping tool. Solder spade lugs mounted on #22 AWG or smaller cable after crimping.

3.2 INITIAL TESTS AND ADJUSTMENTS

A. Purpose - These tests are to ensure that system is ready for Final Tests and Adjustments (described later).

Inspection -Verify prior to beginning actual tests and adjustments on systems.
1. Proper grounding of all electronic components (through third prong of power connector or separate connection between component chassis and ground bus bar).

2. Cables dressed, routed, and labeled, connected with proper polarity.
3. Insulation and shrink tubing in place
4. Dust, debris, solder splatter, etc. removed
5. Proper frequency settings (or modules) at crossovers and controllers.
6. All equalizer bands and tone controls set for flat frequency response.
7. Test Instruments - Perform measurements using professional quality test equipment. Acoustical measurement equipment shall be ANSI Standard Type 1 or IEC Precision Sound Level Meter set for "slow" meter damping and flat response (unless otherwise indicated). Light measuring equipment shall meet ANSI standards for measuring foot-candles.

C. Test Instruments - Perform measurements using professional quality test equipment. Acoustical measurement equipment shall be ANSI Standard Type 1 or IEC Precision Sound Level Meter set for "slow" meter damping and flat response (unless otherwise indicated). Light measuring equipment shall meet ANSI standards for measuring foot-candles.

D. System Grounding Tests — While all sound/AV system power panel circuit breakers are turned off, coordinate with Electrical Contractor to temporarily lift incoming main ground conductor from ground bus in sound/AV system power panel. Measure and record DC resistance between the power panel ground bus (now floating) and the disconnected feed from main ground. Resistance should be greater than 1000 ohms. If less than 1000 ohms, determine the electrical paths between system ground and power panel ground causing such readings, and report findings.

E. Color Bar Adjustments — Adjust color of all projectors, monitors, and plasma displays for consistent color representation using color bar displays generated from projector and/or display internal generators or contractor-provided portable generator. Adjust under ambient lighting conditions anticipated for user of room.

F. Electrical Power Quality - While all sound and audio visual system components are unplugged from electrical power outlets, turn on power to outlets, and confirm proper voltages at each outlet across the following pairs of terminals: hot and neutral, hot and ground, and neutral and ground (zero volts across neutral and ground). Document measurements.

G. General Function Tests - Test each piece of equipment to ensure that it performs its intended function. Include all portable equipment in tests. Intent of initial tests is to verify complete, functioning system before Final Tests and Adjustments. Correct problems found during initial testing before beginning Final
Tests and Adjustments. Document whether all pieces performed intended functions; note any unresolved malfunctions.

H. Initial Tests and Adjustments Data - Submit written report of Initial Tests and Adjustments data upon completion of initial tests. Include printed name(s) of technician(s) performing tests, date(s) and time(s) of tests, model and serial numbers of test equipment, results of each initial test, descriptions of problems encountered and their solutions, and statement that system is ready for Final Tests and Adjustments. Initial Tests and Adjustments Data to include signatures of technician(s) performing tests.

I. Timetable
1. Submit report of Initial Tests and Adjustments data within 2 days of completion of initial tests.
2. Allow minimum of 3 days for review. If resubmittal is required, Owner shall be reimbursed by Contractor for expenses incurred.

3.3 FINAL TESTS AND ADJUSTMENTS

A. Purpose — These tests are to be witnessed by Acoustical Consultant to determine if system is complete and functioning as designed. Also, Acoustical Consultant will perform listening and viewing tests and witness adjustments of all images for optimum clarity.

B. Timetable - Coordinate with Owner, General Contractor, and Acoustical Consultant to schedule Final Tests and Adjustments after submittal of Initial Tests and Adjustments data.

C. System and Site Conditions — Acoustical Consultant (as Owner's representative) will witness Final Tests and Adjustments. Have systems fully functional and ready for inspection and testing

upon Consultant's arrival. Coordinate with all trades for quiet conditions throughout the listening areas and for the duration of the test schedule. If upon Consultant's arrival, systems do not meet criteria, site is not sufficiently quiet, or if Owner or Acoustical Consultant is required to make additional trips to job site to witness additional testing or perform additional reviews of installed equipment, Contractor shall reimburse Owner for labor and expenses incurred by having incurred costs deducted from payments to contractor.

D. Test Labor - Provide technician familiar with sound and audio visual systems and operation of test equipment to perform testing. Provide additional technician to assist in the tests and to perform troubleshooting, repairs, and adjustments. Include labor for these technicians to be present for two(2) ten(10)-hour days during Final Tests and Adjustments.

E. Test Equipment - Provide professional quality test equipment on site for final acceptance testing. Test equipment to be available for entire period through final system acceptance. Submit letter listing test equipment make and model numbers 10 days prior to scheduled Final Tests and Adjustments. (Note: Acoustical Consultant will provide TEF machine for observing results of adjustments to delays, filters, and gains.)

F Laptop Computer — Provide with necessary cable and software for configuring AMX hardware.

Program Source Material — Wide range of videotape programs recorded using VHS and S-VHS. Also provide one blank (or erasable) medium for each recording format in the system.

H. Tools - Provide standard hand tools including screwdrivers, pliers, wire strippers, nut drivers, soldering iron, and other tools appropriate for troubleshooting system problems during testing.

I. Ladders and Scaffolds - Provide ladders and scaffolds to inspect/adjust loudspeakers and rigging points.

J. Communication - Provide 3 portable UHF band two-way radios for use during final testing. Transmission range: sufficient to cover the entire project. Include rechargeable batteries/recharger and holster for wearing on belt. Make radios available for duration of testing process, including follow-up visits. Confirm that radio frequencies used are acceptable and do not conflict with operation of other RF devices in vicinity.

K. Verification of Initial Tests and Adjustments - Verify that Initial Tests and Adjustments have been performed and meet criteria. During Final Tests and Adjustments, Acoustical Consultant may require portions of the Initial Tests and Adjustments to be repeated. Repeat measurements as requested without claim for additional payment.

L. Procedures

1. Control Functions - Check control functions for proper operation, from controlling devices to controlled devices.
2. Perform ANSI projected light measurement test for video/data projectors. Refer to ANSI PH3.705-80(R85) or ANSI PH7.201-83.
3. Adjustments - Adjust, balance, and align equipment for optimum quality, meeting manufacturers published specifications and as requested by owner and audio-visual consultant.
4. Inventory — Inventory all installed and portable equipment for correct quantities.
5. Other Tests - Perform any other tests on any piece of equipment or audio visual system as requested by Consultant.

3.4 FINAL ACCEPTANCE BY OWNER

A. Certificate — Submit Certificate of Final Acceptance form signed by Owner verifying complete installation and proper operation of systems upon fulfillment of all requirements and upon recommendation by Consultant.

B. General Adjustments — Adjust, balance, and align equipment for optimum quality, meeting manufacturers published specifications.

Input Jack Demonstration — Demonstrate proper performance and phase of each system input jack (all video, computer and audio input jacks) as received at audio visual, sound and broadcast

systems.

D. Inventory — Inventory all installed and portable equipment for correct quantities.

E. Functional Demonstration — Demonstrate operation of each function of each major piece of equipment.

F Other Tests - Perform any other tests on any piece of equipment or audio system as requested by Consultant.

G. Final Equipment Settings — Record final settings of all equalizer bands, tone controls, filters, delays, limiters, etc., including those established through computer software settings. Include descriptions of settings (including software settings) in Operation and Maintenance Manual. Include software copy of configuration file(s) in Operation and Maintenance Manual.

H. Security Inspection — Inspect equipment for security from tampering (covers, shaft-locks, etc.).

I. Review of Labels — Review installed labels on cables, equipment, controls, and terminal strips.

J. Review of Heat Dissipation — Survey temperatures of each piece of equipment after 4 hours use (minimum). Note any hot equipment.

3.5 SUPPORT DURING OWNER'S FIRST USE OF COMPLETED SYSTEM

Provide personnel familiar with design, installation, and operation of the system to be present at Owner's first use of the completed system (up to 10 hours in a single session). During first use, respond to Owner requests for troubleshooting, adjustments, and additional training. If no one contractor employee or representative can provide expertise in all aspects of the system, provide multiple personnel for the 4 hours as required. Schedule presence of personnel in advance with Owner. Should significant elements of the new system be operational prior to final completion, Owner may elect to schedule contractor presence for conference function prior to final completion of system. Should Owner exercise this option, contractor presence will not be required at first use following final completion.

END OF SECTION